

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant : Ohtani, et al. Art Unit : 2871
Serial No. : 09/588,996 Examiner : David Chung
Filed : June 6, 2000
Title : ACTIVE MATRIX LIQUID CRYSTAL WITH CAPACITOR BELOW
DISCLINATION REGION

Mail Stop Amendment

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

REPLY TO ACTION OF DECEMBER 14, 2004

In reply to the Office Action of December 14, 2004, Applicant submits the following remarks.

Claims 1, 2, 4-7, 11-16, 20-22, and 26-38 are pending, with claims 1, 2, 4, 5, 11, 14, 20, 26, and 29 being independent. Claims 3, 8-10, 17-19, and 23-25 were previously canceled.

Claim 1 is allowed, and claims 32-38 are objected to as being dependent upon rejected base claims, but would be allowable if re-written in independent form. Applicant thanks the Examiner for indicating the presence of allowable subject matter in claims 1 and 32-38.

Claim 2 is rejected under 35 U.S.C. 102(e) as being anticipated by, or in the alternative, under 35 U.S.C. 103(a) as being obvious over, U.S. Patent No. 5,708,485 to Sato et al. (Sato). Claims 4-7, 11-13 and 26-31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sato in view of U.S. Patent No. 5,459,596 to Ueda et al. (Ueda), U.S. Patent No. 5,781,260 to Miyazawa (Miyazawa), U.S. Patent No. 5,835,171 to Hanazawa (Hanazawa), and U.S. Patent No. 5,345,324 to Koseki (Koseki). Claims 14-16 and 20-22 are rejected under 35 U.S.C. 102(e) as being anticipated by, or in the alternative, under 35 U.S.C. 103(a), as being obvious over Sato.

Regarding the above-listed rejections, Applicant respectfully submits again that neither Sato, nor any proper modification of Sato, nor any proper combination of Sato with Hirata, Ueda, Miyazawa, Hanazawa, and/or Koseki, discloses or fairly suggests all of the elements of at least independent claims 2, 4, 5, 11, 14, 20, 26, and 29. Moreover, Applicant submits that the proposed combination of Sato and Hirata with one of Ueda, Miyazawa, Hanazawa, and/or Koseki is invalid for failure to provide proper motivation to combine in the manner recited in

independent claims 2, 4, 5, 11, 14, 20, 26, and 29, and, in particular, fails to consider portions of those references which teach away from the proposed combination.

In other words, Applicant respectfully asserts, again, the arguments made in Applicant's response of September 20, 2004 (some of which are substantially repeated, below). In response to Applicant's arguments of September 20, 2004, the present Office Action asserts, in the "Response to Arguments" section on page 8 of the Action, that "Applicant appears to have argued against the references individually without accounting for their combined teaching." The Office Action further asserts that, "only claims 2 and 4 explicitly require the capacitor to be formed in the corner of the pixel where the rubbing operation begins," as opposed to being formed in a region comprising the corner.

Regarding the latter point, Applicant notes that the following comments consider the claimed implementations in which the capacitor/switching element is formed in a region comprising the (claimed) corner. Regarding the former point, Applicant respectfully asserts that, to the contrary, Applicant precisely did not argue that Sato fails to disclose the general structure described in the Office Action, or that Ueda, Miyazawa, Hanazawa, or Koseki fail to disclose a conventional rubbing operation. Rather, Applicant argued (1) that none of Ueda, Miyazawa, Hanazawa, or Koseki suggest (or disclose) an advantage to beginning such a rubbing operation in a particular region of a pixel (comprising a corner, or in the corner itself) in which a capacitor and/or switching element is formed; (2) that Koseki teaches away from the proposed combination, and (3) that the unexpected results cited in Applicant's specification, along with the large number of references cited for their teaching of "conventional" rubbing operations (but which do not teach Applicant's claimed rubbing operation) illustrate the non-obvious nature of Applicant's claimed invention.

Applicant respectfully notes that the Office Action fails to address any of these three arguments. Instead, the Office Action appears merely to have repeated the previously-issued rejections, without considering Applicant's amendments of September 20, 2004. For example, the Office Action maintains, as summarized above, that claims 2, 14-16, and 20-22 are rejected under 35 U.S.C. 102(e) as being anticipated by, or in the alternative, under 35 U.S.C. 103(a) as

being obvious over Sato. However, the Office Action later admits that "Sato et al. does not disclose rubbing an alignment layer in one direction from one corner of the pixel" (see, e.g., page 7, lines 17-18). Therefore, Applicant submits that claims 2, 14-16, and 20-22 (as amended by virtue of Applicant's September 20, 2004 response) may not, by virtue of the just-quoted admission of the Office Action, be rejected in any alternative under 35 U.S.C. 102(e).

Further, regarding the three arguments summarized above, Applicant again submits that FIG. 1 (and FIGS. 5A, 8, 7A, 9, and 10) of Koseki et al. illustrates a thin-film transistor formed in an opposite corner from that at which rubbing begins, i.e., that Koseki discloses rubbing toward a TFT, and, therefore, teaches away from the proposed combination of Sato (and Hirata) with Koseki. Therefore, as stated above, Applicant submits that the present rejection fails to consider those portions of the secondary reference that "teach away" from the proposed combination (See, e.g., MPEP 2141.02 and 2143.01).

Still further, Applicant respectfully submits that the above-referenced increase in effective aperture area constitutes an unexpected result that illustrates the non-obviousness of Applicant's claimed invention. In this regard, Applicant submits that the sheer number of references presently cited against Applicant weigh in Applicant's favor on this point. That is, the Office Action seeks to establish that the claimed rubbing operation was common and conventional, but, in so doing, also establishes that practitioners of the rubbing operation did not recognize either (a) Applicant's claimed feature of placing a capacitor and/or switching element in a corner from which the rubbing operation began, (b) the existence of disclination in this corner, or (c) Applicant's unexpected result and advantage that an effective aperture area may be increased by virtue of the claim features recited above. In fact, as already noted, the references teach away from a recognition of these features and advantages.

For example, independent claim 2 recites, "wherein said capacitor covers at least an active region of said switching element that is overlapped with one corner of a pixel where disclination is likely to occur due to a rubbing operation beginning in said corner..." Somewhat similarly, independent claim 4 recites, "an orientation film formed on said pixel electrode wherein a surface of the orientation film has been rubbed in one direction from one corner of the

pixel ...wherein said auxiliary capacitor is positioned so as to cover a part of said pixel including said one corner thereof..." Further, independent claim 5 recites, "liquid crystal molecules arranged between said first substrate and said second substrate, said liquid crystal molecules oriented by rubbing in one direction from one corner of said pixel ... wherein a disclination of said liquid crystal molecules occurs in a region comprising said one corner, and wherein said region and said capacitor overlap with each other.

As shown in the above-quoted limitations, independent claims 2, 4, and 5 recite that a rubbing operation is performed, beginning in a selected corner that is defined by a direction of the rubbing operation, and that a capacitor or switching element is formed in the particular, selected corner, or in a region comprising the corner.

The Office Action maintains the position that Sato generally discloses, as shown in FIGS. 1 and 2, an active matrix display that includes a thin film transistor 7, semiconductor thin film 10, source line 9, gate line 8, pixel electrode 6. A metal interconnection 12 is electrically connected to a drain of the thin film transistor 7 and the pixel electrode 6. An insulating layer 17 is formed over the source line 9, and a conductive light blocking film 16M is formed over the insulating layer 17. The conductive light blocking film 16M and the metal interconnection 12 partially overlap to form a capacitor.

The Office Action admits that Sato is silent regarding the occurrence of disclination, and relies on U.S. Patent No. 5,652,634 to Hirata (Hirata) to provide "... evidence that disclination is inherent in the device of Sato et al. in regions comprising the thin film transistor and storage capacitor." The Office Action further admits, as referenced above, that "Sato et al. does not disclose rubbing an alignment layer in one direction from one corner of the pixel," and relies on any one of Ueda, Miyazawa, Hanazawa, or Koseki to illustrate that such rubbing "was common and conventional at the time of invention."

Thus, as already stated above, Applicant respectfully submits that this rejection fails to disclose or properly suggest the claimed feature(s) that the capacitor and/or switching element are formed in the corner that is defined by the rubbing operation, or in a region comprising the corner, as recited in independent claims 2, 4, and 5. That is, even assuming for argument's sake

that Sato inherently discloses disclination, and that a rubbing operation was conventional, Applicant submits that still the proposed combination does not disclose or suggest that a capacitor and/or thin film transistor is formed in the particular corner from which rubbing began (or in a region comprising that corner), or that disclination occurs in the particular corner, as recited in claims 2, 4, and 5 (also see Applicant's specification at, for example, page 13, lines 19-20).

As discussed in Applicant's specification (see, for example, page 7, lines 1-7; page 14, line 4-11, and page 18, lines 15-22), such features enable the advantage of an increase in effective aperture area, which improves a display area and/or quality of an active matrix device. Applicant submits that, even if Ueda, Miyazawa, Hanazawa, or Koseki disclose a rubbing operation in a general sense, none of these references recognizes or discloses the above features, or recites any advantage or motivation for providing a capacitor and/or switching element in a corner from which the rubbing operation began, or in a region comprising the corner.

In conclusion, and as previously stated in Applicant's response of September 20, 2004, Applicant submits that the proposed combination(s) does not disclose or properly suggest Applicant's claimed relationship between a defined corner at which the rubbing operation begins (and at which disclination is apt to occur) and the capacitor and/or switching element. Instead, Applicant submits that the proposed combination merely serves to point out the fact that none of the plurality of cited references, whether taken alone or in combination, disclose or properly suggest the claim features recited above, and, further, that advantages that flow from Applicant's claimed invention were not expected, recognized, or taught anywhere in the prior art.

Accordingly, Applicant submits that independent claims 2, 4, and 5 are in condition for allowance. Independent claims 11, 14, 20, 26, and 29 recite the same or similar claim features (or combination of claim features) as recited above with respect to independent claims 2, 4, and 5. As a result, Applicant submits that these claims are allowable for at least the same reasons discussed above. Accordingly, Applicant submits that dependent claims 6, 7, 12, 13, 15, 16, 21, 22, 27, 28, 30, and 31 are allowable for at least the same reasons.

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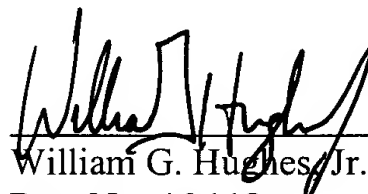
Based on the above, and since claims 1 and 32-38 have already been indicated to contain allowable subject matter, Applicant submits that all of pending claims 1, 2, 4-7, 11-16, 20-22, and 26-38 are in condition for allowance, and such action is hereby requested in the Examiner's next official communication.

Please apply any charges or credits to deposit account 06-1050.

Respectfully submitted,

Date: _____

March 14, 2005



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